

REPLICATION IN MATHEMATICS EDUCATION

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The goal of this working group is to examine the role replication studies should have in mathematics education research. In recent years psychology has been gripped by serious methodological concerns: the so-called ‘replication crisis’. A large number of psychology academics now believe that many published research findings cannot be replicated. This working group will discuss the replication crisis in psychology, discuss the extent to which similar issues apply in mathematics education, and consider potential solutions.

In 2011 Simmons, Nelson and Simonsohn noted that quantitative researchers have a great deal of flexibility in their analytical choices (e.g., exclusion criteria, dependent measures, including covariates), which may lead the traditional 5% false-positive rate to be inflated to as much as 60%. The most obvious consequence of an inflated false-positive rate is that some published scientific articles report effects that are simply not true. The Open Science Collaboration (2015), a group of 270 scientists, published a landmark paper that aimed to determine whether or not this was the case, by conducting 100 replications of studies reported in three psychology journals in 2008 97% of the original articles found significant results (i.e., p values less than .05), but only 36% of the replications did. Although there has been some debate about how to interpret the OSC's findings (e.g., Gilbert, King, Pettigrew, & Wilson, 2016), the headline figures do seem to suggest that the serious concerns are merited.

This issue is particularly live in the context of education research. Makel and Plucker (2014) found that only 0.13% of articles published in the top 100 education journals have reported replication studies. We simply do not know the extent to which published educational research findings replicate.

The goal of this working group, which will meet for the first time at PME42, is to focus on the role of replication research within mathematics education. Drawing on recent discussions in the *Journal for Research in Mathematics Education* (e.g., Schoenfeld, 2018; Star, 2018), we will discuss the following topics:

- What is replication research in the context of both quantitative and qualitative mathematics education research?
- Should replication studies be conducted, presented at scientific conferences and published in high-profile academic journals?
- Should the mathematics education community encourage actions to improve replicability (e.g., preregistered analysis plans, open data, etc.)?

Based on the discussions, a Research Forum may be set up for the forthcoming PME conference, and a special issue focussing on good replication practices in mathematics education may be initiated.

ACTIVITIES

First Session (90 min): What? And why?

- Introduce the goal of the WS and presentation of examples of (quantitative) replication studies in mathematics education (20 min).
- Small group discussion: do (quantitative) replication studies in mathematics education have value? (25 min). Followed by plenary summary (20 min).
- Plenary discussion on replication in qualitative research (25 min).

Second Session (90 min): How?

- Summary of results of the first session (10 min).
- Small group discussion: quality criteria for replication studies and guidelines for their inclusion in conferences and journals (30 min). Followed by plenary summary (20 min).
- Plenary discussion on future ideas (research forum, special issue) (30 min).

References

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